

Advance Solenoid Replacement Procedure

The following procedure addresses how to replace the advance solenoid (AS) on a MK4 or MK3 TDI w/ rotary injection pump.

This guide outlines how to work on the pump itself after it is removed from the car. Since this pump was installed on 3 different chassis, and 5 different body styles in North America alone, a complete parts and tools list is not given. Please read this in its entirety before attempting anything so you can determine your parts, tools, and safety equipment needs.

The advance solenoid controls timing by regulating the fuel case pressure in the area enclosed by the red oval.

When the AS allows fuel pressure in the case to enter this area, it forces the Piston Injection Timing Device against the spring. This rotates the Rolling Ring and Pressure Rollers via the Pin (counter-clockwise from the classical front of the engine). The position of the Pressure Rollers determine when the plunger compresses fuel during an injection stroke in relation to crank angle.

Essentially, AS open = more advance; AS closed = less. The AS itself is regulated by a pulse signal from the ECU to ensure optimal timing under all conditions.

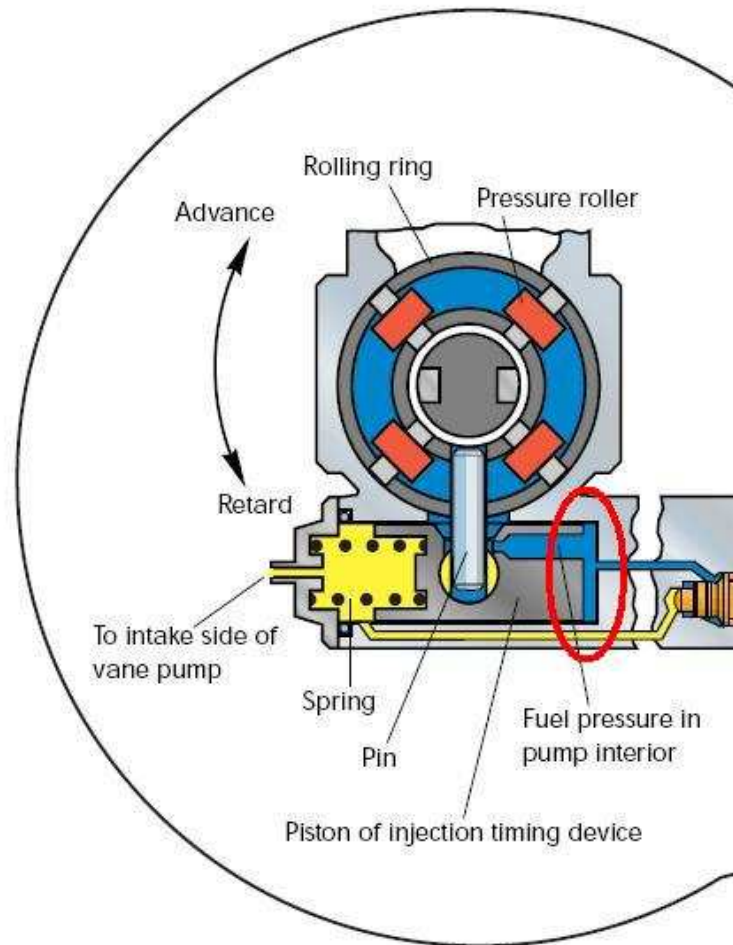


Fig 1. 'back' (from the flywheel) view of the injection pump; The AS is displaced 90° for ease of depiction

The typical failure mode of the AS is open; thus the car will operate at full advance under all conditions. This causes the following symptoms:

1. In VAGcom; timing will be off the chart, pegged at 255 regardless of coolant or fuel temp.
2. Low power – the ECU reduces fueling to prevent engine damage.
3. Loud diesel clatter.
4. Poor fuel efficiency.
5. Needle lift sensor implausible signal code.
6. N108 cold start valve codes.

Fortunately, replacement is relatively straightforward. Pump removal is required, as the accessory bracket blocks the AS. It is important to have the correct 'locking' tools on hand to properly tension and statically time the car when the pump is reinstalled.

Please refer to the appropriate timing belt procedure to statically time your car after pump installation.

A3: <http://tdiclub.com/articles/A3-TimingBelt/>

A4: <http://pics.tdiclub.com/pdf/a4timingbelt.pdf>

Note that since complete belt removal is not required for pump removal, it is not necessary to remove the side motor mount, lower timing belt covers, accessory drive belt(s) or even get under the car.

In order to remove the pump, the following items will need to be removed for access:

1. High pressure injection lines.
2. Rubber feed and return fuel lines.
3. Timing belt and injection pump sprocket; you may leave the timing belt in the car, simply push it rearward, out of the way.
4. On the AHU/1Z, an appropriate puller is necessary to remove the IP sprocket. I recommend metalnerd.com as a tools source.

Following removal of the above items, disconnect the electrical connector(s). (1 on an A4 ALH; 2 on the A3/B4 AHU/1Z)

Remove the fasteners that attach the IP to the accessory bracket.

On the A4 w/ ALH engine, there are simply 4 bolts. 3 connect the pump case in a triangular pattern to the accessory bracket, and one on the opposite end of the pump adjacent to the high pressure fuel lines.

On the A3/B4 AHU/1Z cars, there are 2 studs and 1 bolt on the accessory bracket, and 1 bolt adjacent to the high pressure fuel lines.

The pump will now be free to slide through the accessory bracket and up out of the car.

With the pump removed from the car, secure it in a vise so it is stable while you are servicing it. Utmost cleanliness is imperative when working on the pump, so external cleaning with brake cleaner and compressed air is recommended. Protect your eyes here.

With the pump secure, remove the golden steel plate that is secured with 1 T30, and 2 5mm allen bolts to the cast iron hydraulic head. An ALH pump is shown; AHU similar.

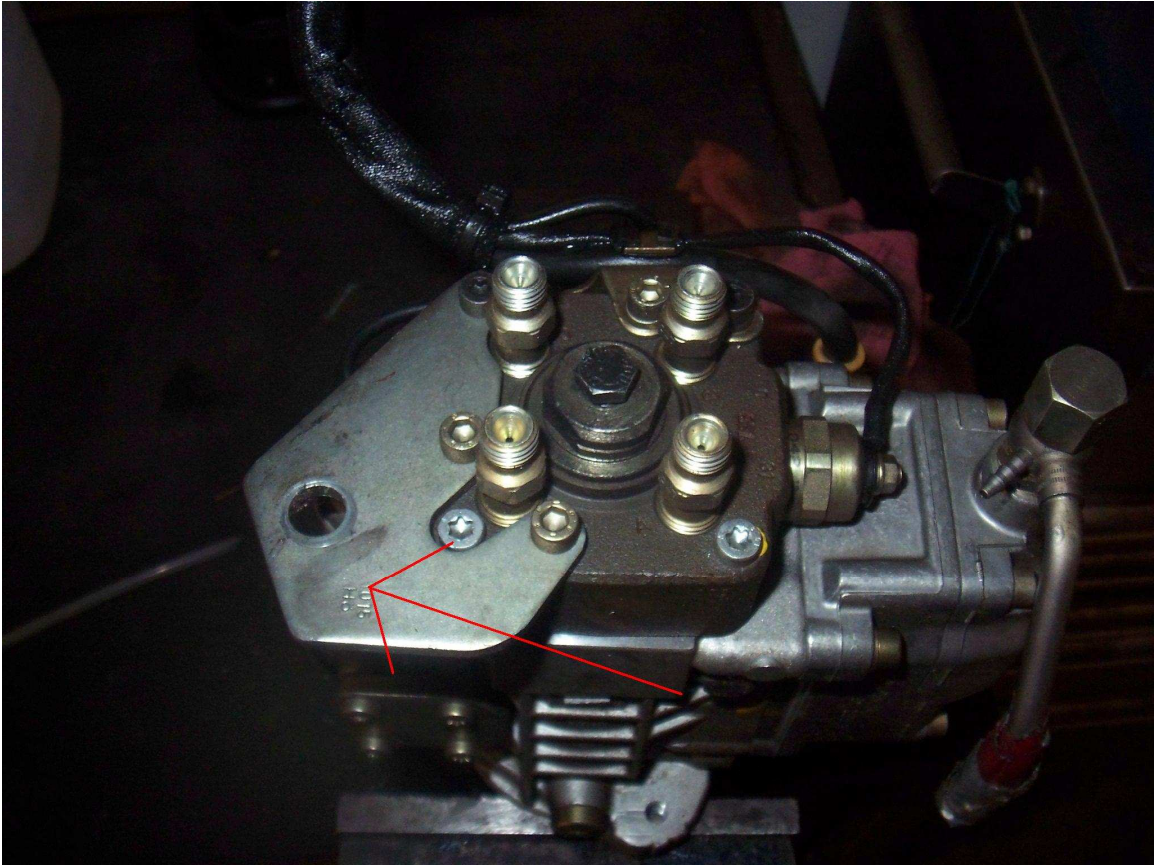


Fig 2 The upright pump in a vise; remove the large gold plate to expose the advance solenoid.



Fig 3. The Advance Solenoid.

With the AS visible, it's time to get started on the wiring.

Regardless of engine, the advance solenoid is linked by 2 wires.

On the ALH, the brown wire connects to position 9, and the black wire connects to position 10.

On the AHU/1Z the wires attach to a smaller 3 prong connector that is unlabeled.

Record their position before removal from the connector.

Release the wiring spades from the connector:

On the ALH, depress the two tabs on the purple locking piece in the connector, and move it to the opposite side of the connector. Use a pick or small screwdriver. This is delicate, in the words of Jim "Dieselgeek" Roysden, "Clear your mind."



Fig. 4 The installed position of the connector lock.



Fig. 5 The open position of the connector lock.

With the lock shifted to the open position, insert an appropriate tool; the Metalnerd electrical pin extractor tool is shown; simultaneously pull gently on the wire you are trying to remove. The tongs of the tool must be inserted fully into the rectangular slots above and below the wiring spade. A paperclip can be used as well, although it is more difficult.

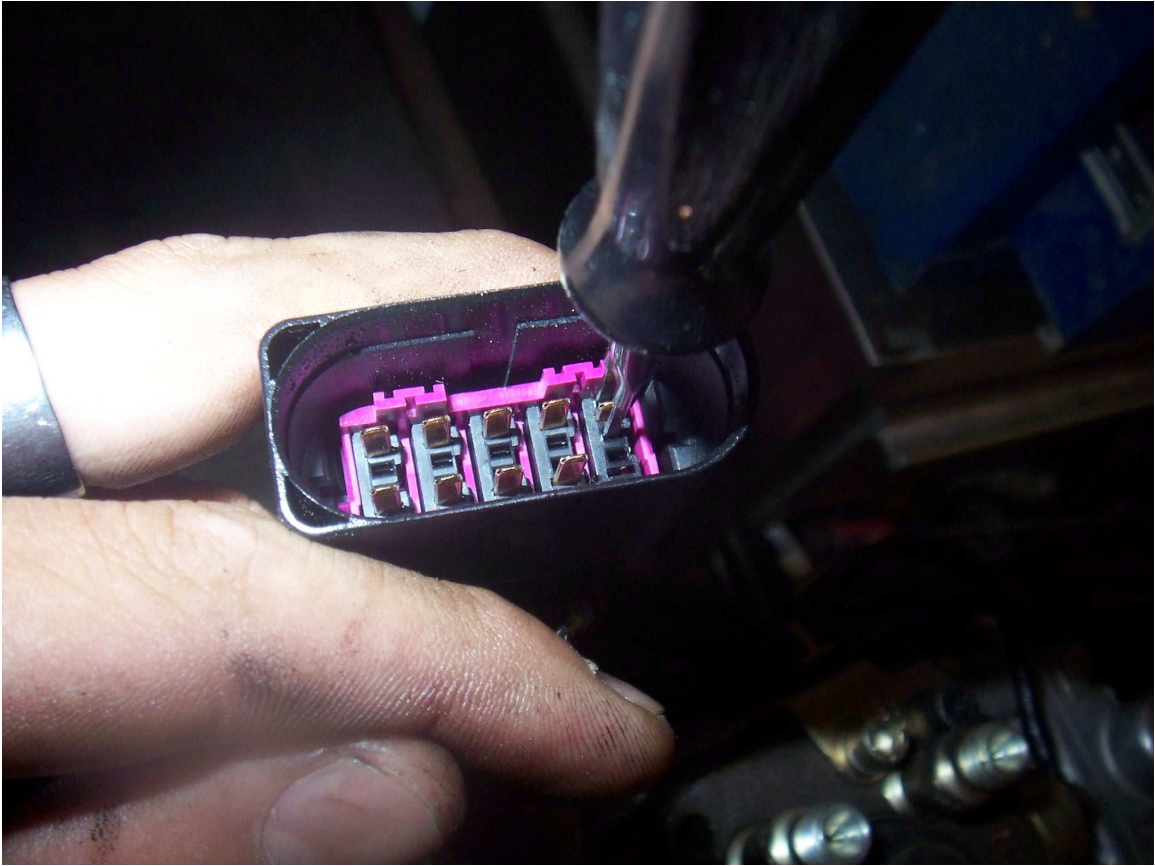


Fig. 6 Insert the tool in the slots, and gently pull the wire out from the back.



Fig. 7 A removed spade. The tool depresses the metal tabs on the sides of the spade to release it from the plastic connector.

On the AHU/1Z –

Insert the appropriate wiring connector tool into the slots on either side of the spade.
This differs from the ALH procedure only in that there is no purple locking device.

Slide the AS leads out of the protective cover that wraps the other wires leading to the pump.

Back on the pump itself, remove the 2 T30 bolts that secure the AS to the pump case.

Extract the AS evenly from the pump case. Remember, cleanliness is key!



Fig. 8 The extracted AS.

Installation is reverse of removal. (sorry) Note the following:

1. If you're swapping in a used AS, it's a good idea to replace the green seal on the AS itself. Dieselgeek.com sells complete seal kits. Lubricating it with fuel prior to installation reduces the chance of damaging the seal.
2. While I was unable to find torque specs for the pump itself, 10 ft-lbs. feels right, won't come loose, leak, or strip the case.
3. It should go without saying that priming the fuel system after the pump is installed required. See Whitedogs "no start" thread for details.
<http://forums.tdiclub.com/showthread.php?t=199398>
4. If you have a A3/B4; valve cover gasket replacement is recommended.